Version with Markings to Show Changes Made:

In the claims:

38 (Original) A power combiner having:

a central axis about which is disposed a plurality k of cylindrical feed waveguides, each said feed waveguide having a radius, an input port and a launching port, all centered on a feed waveguide axis, said launching port including a cylindrical helix;

a plurality k of focusing reflectors, one for each said feed waveguide, each said focusing reflector centered on said feed waveguide axis;

a final waveguide coaxial to said central axis and collecting power reflected by each said focusing reflector with a proximal final waveguide reflector port.

39 (Original) The power combiner of claim 38 where

$(1/\pi)$ arc cos (p/X_{pq}) is an integer, when

said p = azimuthal wave number

said q = radial wave number

said X_{pq} = the eigenvalue of the mode.

40 (Amended) The power combiner of claim 38 where said feed ~~guide~~ waveguide launch port helical section is formed

by sweeping a line of length $L_{feedlaunch} = \theta * L_{launch}/2*pi$ at said radius from and parallel to said feed ~~guide~~ waveguide axis, where θ is the angle in radians about said feed waveguide axis and said L_{launch} is the length of the helical cut.

41 (Original) The power combiner of claim 38 where said final waveguide is a cylinder.

42 (Original) The power combiner of claim 38 where said feed waveguide axis is parallel to said central axis.

43 (Original) The power combiner of claim 38 where each said feed waveguide radius is equal to each other said feed waveguide radius.

44 (Original) The power combiner of claim 38 where at least one said feed waveguide radius is different from any other said feed waveguide radius.

45 (Amended) The power combiner of claim 38 where each said feed waveguide helical section angle $\theta = 0$ is uniformly offset with respect to a plane from said central axis to said feed ~~guide~~ waveguide center axis.

46 (Amended) The power combiner of claim 38 where each said feed waveguide helical section angle $\theta = 0$ is not uniformly offset with respect to a plane from said central axis to said feed ~~guide~~ waveguide center axis.

47 (Amended) The power combiner of claim 38 where said feed ~~guide~~ waveguide helical launch port has a helical cut depth

$$L_{feedlaunch} = 2\pi\{k_{par}\,sqrt\{1-(m/X_{mn})^2\}/\{k_{perp}\cos^{-1}(m/X_{mn})\}$$

where

k_{par} is the parallel, or axial wave number

m is the azimuthal index of the mode in said feed ~~guide~~ waveguide

n is the radial index of the mode in said feed ~~guide~~ waveguide

X_{mn} is the eigenvalue of the mode

K_{perp} is the perpendicular wave number.

48 (Cancelled)

49 (Original) The power combiner of claim 38 where said reflector is formed by a curve extruded along said central axis, said reflector curve comprising a locus of points.

50 (Amended) The power combiner of claim ~~38~~ 49 where said locus of points satisfies the following criteria for each given locus point:

where each said feed waveguide has a circular feed caustic and a feed caustic phase front, and said final ~~guide~~ waveguide has a circular final caustic and a final caustic phase front, for each point on said locus, a first line segment starting from said locus point, touching said feed caustic and ending on said feed caustic phase front, and a second line segment starting on said locus point, touching said final caustic and ending on said final caustic phase front:

a) the path length of said first line segment added to said second line segment is a constant,

b) at each said locus point, an intersection point is defined by the intersection of said locus point and a line which is tangent to said reflector curve at said locus point, and a perpendicular line which is perpendicular to said tangent line at said locus point, said perpendicular line bisecting the angle formed by said first line segment and said second line segment.

51 (Original) The power combiner of claim 38 where each said ~~plurality comprises k feed waveguides and~~ k reflectors,

~~and the~~ has an angular extent ~~of each said reflector~~ about said central axis ~~is~~ of 360/k degrees.

52 (Original) The power combiner of claim 38 where each said input waveguide is coupled to a source of asymmetric traveling wave power, said input power traveling through each feed waveguide, reflecting from said reflector and collected in said final waveguide.

53 (New) The power combiner of claim 38 where each said feed waveguide, each said reflector, and said final waveguide are electrically conductive.

54 (New) The power combiner of claim 38 where each said feed waveguide, each said reflector, and said final waveguide include an electrically conductive surface.

55 (New) A power combiner comprising:

a plurality k of feed waveguide cylinders, each said feed waveguide cylinder having a feed waveguide axis and a radius, and also having a launch end which includes a helical cut ramp;

a cylindrical final waveguide;

a plurality said k of reflectors interposed between said feed waveguide launch end and said final waveguide,

each reflector for directing wave energy from said feed waveguide cylinder to said final waveguide;

where k is n integer greater than 1.

56 (New) The power combiner of claim 55 where

$(1/\pi)$ arc cos (p/X_{pq}) is an integer, when

said p = azimuthal wave number

said q = radial wave number

said X_{pq} = the eigenvalue of the mode.

57 (New) The power combiner of claim 55 where said feed waveguide launch port helical section is formed by sweeping a line of length $L_{feedlaunch} = \theta * L_{launch}/2*pi$ at said radius from and parallel to said feed waveguide axis, where θ is the angle in radians about said feed waveguide axis and said L_{launch} is the length of the helical cut.

58 (New) The power combiner of claim 55 where said feed waveguide axis is parallel to said central axis.

59 (New) The power combiner of claim 55 where any said feed waveguide radius is equal to any other said feed waveguide radius.

60 (New) The power combiner of claim 55 where at least one said feed waveguide radius is different from any other said feed waveguide radius.

61 (New) The power combiner of claim 55 where each said feed waveguide helical section angle $\theta = 0$ is uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

62 (New) The power combiner of claim 55 where each said feed waveguide helical section angle $\theta = 0$ is not uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

63 (New) The power combiner of claim 55 where said feed waveguide helical launch port has a helical cut depth

$$L_{feedlaunch} = 2\pi\{k_{par}\,sqrt\{1-(m/X_{mn})^2\}/\{k_{perp}\cos^{-1}(m/X_{mn})\}$$

where

k_{par} is the parallel, or axial wave number

m is the azimuthal index of the mode in said feed waveguide

n is the radial index of the mode in said feed waveguide

X_{mn} is the eigenvalue of the mode

K_{perp} is the perpendicular wave number.

64 (New) The power combiner of claim 55 where said reflector is formed by a curve extruded along said central axis, said reflector curve comprising a locus of points.

65 (New) The power combiner of claim 64 where said locus of points satisfies the following criteria for each given locus point:

where each said feed waveguide has a circular feed caustic and a feed caustic phase front, and said final waveguide has a circular final caustic and a final caustic phase front, for each point on said locus, a first line segment starting from said locus point, touching said feed caustic and ending on said feed caustic phase front, and a second line segment starting on said locus point, touching said final caustic and ending on said final caustic phase front:

a) the path length of said first line segment added to said second line segment is a constant,

b) at each said locus point, an intersection point is defined by the intersection of said locus point and a line which is tangent to said reflector curve at said locus point, and a perpendicular line which is perpendicular to

said tangent line at said locus point, said perpendicular line bisecting the angle formed by said first line segment and said second line segment.

66 (New) The power combiner of claim 55 where said plurality comprises k feed waveguides and k reflectors, and the angular extent of each said reflector about said central axis is 360/k degrees.

67 (New) The power combiner of claim 55 where each said input waveguide is coupled to a source of asymmetric traveling wave power, said input power traveling through each feed waveguide, reflecting from said reflector and collected in said final waveguide.

68 (New) The power combiner of claim 55 where each said feed waveguide, each said reflector, and said final waveguide are electrically conductive.

69 (New) The power combiner of claim 55 where each said feed waveguide, each said reflector, and said reflector waveguide include an electrically conductive surface.

70 (New Claim) A power combiner comprising:

k feed waveguides, each said feed waveguide formed from a 4 sided polygon conductor comprising a rectangle having a width and height adjoining a triangle having same said height, said polygon then rolled into a cylinder with an axis substantially parallel to said rectangle width thereby forming said feed waveguide, said feed waveguide having a launch end adjacent to said triangle;

a cylindrical final waveguide;

a plurality said k of reflectors positioned between said k feed waveguides and said final waveguide input end;

where k is greater than 1.

71 (New) The power combiner of claim 70 where

$(1/\pi)$ arc cos (p/X_{pq}) is an integer, when

said p = azimuthal wave number

said q = radial wave number

said X_{pq} = the eigenvalue of the mode.

72 (New) The power combiner of claim 70 where said feed waveguide launch port helical section is formed by sweeping a line of length $L_{feedlaunch} = \theta * L_{launch}/2*pi$ at said radius from and parallel to said feed waveguide axis, where θ is the

angle in radians about said feed waveguide axis and said L_{launch} is the length of the helical cut.

73 (New) The power combiner of claim 70 where said feed waveguide axis is parallel to said central axis.

74 (New) The power combiner of claim 70 where each said feed waveguide radius is equal to each other said feed waveguide radius.

75 (New) The power combiner of claim 70 where at least one said feed waveguide radius is different from any other said feed waveguide radius.

76 (New) The power combiner of claim 70 where each said feed waveguide helical section angle $\theta = 0$ is uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

77 (New) The power combiner of claim 70 where each said feed waveguide helical section angle $\theta = 0$ is not uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

78 (New) The power combiner of claim 70 where said feed waveguide helical launch port has a helical cut depth

$$L_{feedlaunch} = 2\pi\{k_{par}\,sqrt\{1-(m/X_{mn})^2\}/\{k_{perp}\cos^{-1}(m/X_{mn})\}$$

where

k_{par} is the parallel, or axial wave number

m is the azimuthal index of the mode in said feed waveguide

n is the radial index of the mode in said feed waveguide

X_{mn} is the eigenvalue of the mode

K_{perp} is the perpendicular wave number.

79 (New) The power combiner of claim 70 where said reflector is formed by a curve extruded along said central axis, said reflector curve comprising a locus of points.

80 (New) The power combiner of claim 79 where said locus of points satisfies the following criteria for each given locus point:

where each said feed waveguide has a circular feed caustic and a feed caustic phase front, and said final waveguide has a circular final caustic and a final caustic phase front, for each point on said locus, a first line segment starting from said locus point, touching said feed caustic and ending on said feed caustic phase front, and a

second line segment starting on said locus point, touching said final caustic and ending on said final caustic phase front:

a) the path length of said first line segment added to said second line segment is a constant,

b) at each said locus point, an intersection point is defined by the intersection of said locus point and a line which is tangent to said reflector curve at said locus point, and a perpendicular line which is perpendicular to said tangent line at said locus point, said perpendicular line bisecting the angle formed by said first line segment and said second line segment.

81 (New) The power combiner of claim 70 where said plurality comprises k feed waveguides and k reflectors, and the angular extent of each said reflector about said central axis is 360/k degrees.

82 (New) The power combiner of claim 70 where each said input waveguide is coupled to a source of asymmetric traveling wave power, said input power traveling through each feed waveguide, reflecting from said reflector and collected in said final waveguide.

83 (New) The power combiner of claim 70 where each said feed waveguide, each said reflector, and said final waveguide are electrically conductive.

84 (New) The power combiner of claim 70 where each said feed waveguide, each said reflector, and said reflector waveguide include an electrically conductive surface.